***AP BIOLOGY SUMMER ASSIGNMENT***

Welcome to the world of Advanced Placement Biology! The attached summer assignment is required for all AP Biology students for the 2010-2011

school year. The assignment consists of two parts – an annotated course outline and an AP Essay**. Both must be neatly handwritten on lined paper**. Typed assignments will result in a grade of 0. **The assignments are due on the** **first day of school.**

**Annotated course outline.** At a minimum, you will review freshman level biology and begin to teach yourself new material. The outline provided presents as questions the major themes and topics covered in an AP Biology course. You must create a completed outline of your own by answering the questions for each topic. Ideally you will also generate additional information about the topics. Don’t write an essay for each; just pick out the big ideas. This outline will allow you to bring a scaffolding of information to the course and you will be able to attach more information to the concepts as the year goes on. Use any information source possible to answer the questions, but you must work independently. Err on the side of explaining more rather than less on topics you find complicated.

**AP Essay.** You will also complete your first AP essay on Domains of Life. A real AP exam would allow you about 20 minutes to complete an essay; keep this in mind when you choose the information to support your assertions.

**The course.** The text we use is Campbell and Reese Biology, 6 th edition. This will not be available to you for the summer assignment. We will complete the 12 required AP labs as well as many additional labs and activities. You will gain practice in writing AP essays, and in answering AP level objective questions. We also encourage application of concepts by reading and discussing current scientific articles. You may want to invest in an AP study guide such as Barron’s AP Biology, or the McGrawHill 5 Steps to a 5. These will NOT get you through the course with an A, but may help to reinforce concepts as well as providing additional review for the AP exam. If you have questions about this assignment, you may contact me at moranc@cfbisd.edu

Also, please visite my website at http://biodude.wikispaces.com for resources to help you with the assignment.

Have a great summer!

Mr. Moran :)

**Annotated Course Outline**

From the University of Georgia

Answer the following questions using a text or Internet sources. This list is not exhaustive; it is only a beginning, and we encourage you to add conceptual questions of your own. Students are

encouraged to focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. Less important is the memorization of specialized terminology and technical details. For example, understanding how protein structure affects enzyme action is more important than memorizing a list of enzyme names. Questions on Advanced Placement Biology Examinations will test students' abilities to explain, analyze, and interpret biological processes and phenomena more than their ability to recall specific facts.

**I. Molecules and Cells**: Cells are the structural and functional units of life; cellular

processes are based on physical and chemical changes.

**A. Chemistry of Life**

1. *Water*

How do the unique chemical and physical properties of water make life on earth

possible?

2. *Organic molecules in organisms*

What is the role of carbon in the molecular diversity of life?

How do cells synthesize and break down?

How do structures of biologically important molecules (carbohydrates, lipids, proteins,

nucleic acids) account for their functions?

3. *Free energy changes*

How do the laws of thermodynamics relate to the biochemical processes that provide

energy to living systems?

4. *Enzymes*

How do enzymes regulate the rate of chemical reactions?

How does the specificity of an enzyme depend on its structure?

How is the activity of an enzyme regulated?

**B. Cells**

1. *Prokaryotic and eukaryotic cells*

What are their similarities and differences?

What are their evolutionary relationships?

2. *Membranes*

What is the current model of the molecular architecture of membranes?

How do variations in this structure account for functional differences among

membranes?

How does the structural organization of membranes provide for transport and

recognition?

What are various mechanisms by which substances cross membranes?

3. *Subcellular organization*

How does compartmentalization organize a cell's functions?

How are the structures of the various subcellular organelles related to their

functions?

How do organelles function together in cellular processes?

What factors limit cell size?

4. *Cell cycle and its regulation*

How does the cell cycle assure genetic continuity?

How does mitosis allow for the even distribution of genetic information to new cells?

What are the mechanisms of cytokinesis?

How is the cell cycle regulated?

How can aberrations in the cell cycle lead to tumor formation?

**C. Cellular Energetics**

1. *Coupled reactions*

What is the role of ATP in coupling the cell's anabolic and catabolic processes?

How does chemiosmosis function in bioenergetics?

2. *Fermentation and cellular respiration*

How are organic molecules broken down by catabolic pathways?

What is the role of oxygen in energyyielding

pathways?

How do cells generate ATP in the absence of oxygen?

3. *Photosynthesis*

How does photosynthesis convert light energy into chemical energy?

How are the chemical products of the lighttrapping

reactions coupled to the

synthesis of carbohydrates?

What kinds of photosynthetic adaptations have evolved in response to different

environmental conditions?

What interactions exist between photosynthesis and cellular respiration?

**II. Heredity and Evolution**: Hereditary events control the passage of structural and

functional information from one generation to the next.

**A. Heredity**

1. *Meiosis and gametogenesis*

What features of meiosis are important in sexual reproduction?

Why is meiosis important in heredity?

How is meiosis related to gametogenesis?

What are the similarities and differences between gametogenesis in animals and

gametogenesis in plants?

2. *Eukaryotic chromosomes*

How is genetic information organized in the eukaryotic chromosome?

How does this organization contribute to both continuity of and variability in the

genetic information?

3. *Inheritance patterns*

How did Mendel's work lay the foundation of modern genetics?

What are the principal patterns of inheritance?

**B. Molecular Genetics**

1. *RNA and DNA structure and function*

How do the structures of nucleic acids relate to their functions of information storage

and protein synthesis?

What are the similarities and differences between prokaryotic and eukaryotic

genomes?

2. *Gene regulation*

What are some mechanisms by which gene expression is regulated in prokaryotes

and eukaryotes?

3. *Mutation*

In what ways can genetic information be altered?

What are some effects of these alterations?

4. *Viral structure and replication*

What is the structure of viruses?

What are the major steps in viral reproduction?

How do viruses transfer genetic material between cells?

5. *Nucleic acid technology and applications*

What are some current recombinant technologies?

What are some practical applications of nucleic acid technology?

What legal and ethical problems may arise from these applications?

**C. Evolutionary Biology**

1. *Early evolution of life*

What are the current biological models for the origins of biological macromolecules?

What are the current models for the origins of prokaryotic and eukaryotic cells?

2. *Evidence for evolution*

What types of evidence support an evolutionary view of life?

3. *Mechanisms of evolution*

What is the role of natural selection in the process of evolution?

How are heredity and natural selection involved in the process of evolution?

What mechanisms account for speciation and macroevolution?

What different patterns of evolution have been identified and what mechanisms are

responsible for each of these patterns?

**III. Organisms and Populations**: The relationship of structure to function is a theme that

is common to all organisms; the interactions of organisms with their environment is the

major theme in ecology.

**A. Diversity of Organisms**

1. *Evolutionary patterns*

What are the major body plans of plants and animals?

2. *Survey of the diversity of life*

What are representative organisms from the Monera, Fungi, and Protista?

What are representative members of the major animal phyla and plant divisions?

3. *Phylogenetic classification*

What are the distinguishing characteristics of each group (kingdoms and the major

phyla and divisions of animals and plants)?

4. *Evolutionary relationships*

What is some evidence that organisms are related to each other?

How do scientists study evolutionary relationships among organisms?

How is this information used in classification of organisms?

**B. Structure and Function of Plants and Animals**

1. *Reproduction, growth, and development*

What patterns of reproduction and development are found in plants and animals and

how are they regulated?

What is the adaptive significance of alternation of generations in the major groups of

plants?

2. *Structural, physiological, and behavioral adaptations*

How does the organization of cells, tissues, and organs determine structure and

function in plant and animal systems?

How are structure and function related in the various organ systems?

How do the organ systems of animals interact?

What adaptive features have contributed to the success of various plants and

animals on land?

3. *Response to the environment*

What are the responses of plants and animals to environmental cues, and how do

hormones mediate them?

**C. Ecology**

1. *Population dynamics*

What models are useful in describing the growth of a population?

How is population size regulated by abiotic and biotic factors?

2. *Communities and ecosystems*

How is energy flow through an ecosystem related to trophic structure (trophic

levels)?

How do elements (e.g., carbon, nitrogen, phosphorus, sulfur, oxygen) cycle through

ecosystems?

How do organisms affect the cycling of elements and water through the biosphere?

How do biotic and abiotic factors affect community structure and ecosystem

function?

3. *Global issues*

In which ways are humans affecting biogeochemical cycles?

**AP Essay**

QUESTION III1999

3. Scientists recently have proposed a reorganization of the phylogenetic system of

classification to include the domain, a new taxonomic category higher (more inclusive)

than the Kingdom category, as shown in the following diagram.



***•* Describe** how this classification scheme presents different conclusions about the

relationships among living organisms than those presented by the previous fivekingdom

system of classification.

**• Describe** three kinds of evidence that were used to develop the taxonomic scheme

above, and explain how this evidence was used. The evidence may be structural,

physiological, molecular, and/or genetic.

**• Describe** four of the characteristics of the universal ancestor.